Peer Review: "Range-wide Status of Colorado River Cutthroat Trout (*Oncorhynchus clarkia pleuriticus*: 2005) by Hirsch et al.

Reviewer: Wayne A. Hubert, Leader, Wyoming Cooperative Fish and Wildlife Research Unit, and Professor, Department of Zoology and Physiology, University of Wyoming, Laramie, Wyoming

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I found this to be a very well-written document that clearly identifies the range-wide status of Colorado River cutthroat trout. The document represents a huge amount of highly credible work by fisheries science professionals in the five-state regions where the subspecies is found. The authors and all of the participants in the workshops and on the assessment teams are to be commended for an exception product that objectively documents, scientifically-credible information on the status of the Colorado River cutthroat trout. The information in the report provides a significant and sound basis for future management of the subspecies.

Four questions were asked regarding the document and my responses to them are as follows:

1. Is the description and analysis of the population trends, population health, genetic status, and historic and current descript of the species accurate?

I will begin by noting that the question is not appropriately stated, the Colorado River cutthroat trout is a subspecies.

My experience with the subspecies has been in Wyoming. However, I could identify no errors in the presentation of information for Wyoming.

2. Does the report provide accurate and adequate review and analysis of the factors affecting the species (habitat loss and modification, overutilization, disease, predation, regulatory mechanisms, and genetic fitness)?

I believe the authors are quite accurate in the identification of factors affecting Colorado River cutthroat trout.

3. Are there any significant oversights, omissions or inconsistencies in the report?

I could not identify any significant oversights, omissions or inconsistencies in the report. However, I would suggest some editorial changes that would add clarity to the report: (1) Within the executive summary and later in the body of the report the authors identify the number of populations that are at risk, genetically unaltered, etc. But, there is no definition of a "population." A clear definition of the term as it is used within this report is needed.

(2) Similarly, within the executive summary and elsewhere, the terms "historical" and "historically" are used to identify conditions sometime in the past. A clear definition of the term is needed. The authors should recall that the general definition of history involves synthesis or documentation based on written records by humans. I believe the time interval of interest precedes the beginning of written records regarding Colorado River cutthroat trout.
(3) I believe the term "meta-population" has been somewhat misused throughout the document. A meta-population exists when there are smaller, relatively isolated populations with limited interchange of individuals. Restoration that joins previously fragmented and isolated populations does not constitute the creation of a meta-population if a continuous population is formed.
(4) I think that more detail should be included regarding the ranking systems that were created to conduct assessments as well as the methods for aggregations of rankings into indices. It is not clear as to how the ranking were established or aggregated for the Genetic Stability Assessment, Significant Disease Influence Assessment, Conservation Population General Health Assessment, or Evaluation of Potential CRCT Population Restoration and Expansion Opportunities. I do not think that the assessments could be duplicated in the future based on the level of detail provided in the report.
(5) The description of sources of genetic data is unclear. For example, what genetic technique(s) were used to identify "hybridized" fish? How was the extent of "introgression" determined? The sources of data and how they are summarized to create Table 5 should be explained in more detail.
(6) The criterion that a conservation population be at least 90% genetically pure was used. What is 90% genetically pure? Does it mean that 90% of the fish in a sample from a population show no evidence if introgression with rainbow trout? Or, 90% of the genes that define a cutthroat trout are present in the fish? Explanation is needed.

4. Are the conclusions logical and supported by the evidence provided?

I believe that conclusions are logical and supported by the evidence provided. In no case do the authors appear to go beyond the data in forming conclusions not supported by evidence.